CLAIMS

<u>What is claimed is:</u>

1.   A method for maintaining an optimal level of inventory comprising the following steps:

     (a)   determining demands on inventory residing at a location;

     (b)   determining an optimum level of inventory to reside at the location based upon the inventory demands;

     (c)   sensing the level of inventory at the location to determine if the inventory is at the optimum level;

     (d)   if it is determined in step c that the level of inventory is less than the optimum level, then determining a method to replenish the inventory; and

     (e)   if it is determined in step c that the level of inventory is greater than or equal to the optimum level, then repeating step c and subsequent steps.

2.   A method for maintaining an optimal level of inventory comprising the following steps:

     (a)   determining a product type of a product in inventory, the inventory residing at a location;

     (b)   determining a demand type based on the product type of the product;

     (c)   determining an optimum inventory level of at least one product in inventory at the location;

     (d)   sensing the inventory level of at least one product in inventory at the location to determine if the inventory level of the product is at the optimum level;

     (e)   if it is determined in step d that the inventory level of the product is less than the optimum level, then determining a method to replenish the inventory; and

     (f)   if it is determined in step d that the level of inventory is greater than or equal to the optimum level, then repeating step d and subsequent steps.

3.   The method of Claim 2 comprising the further steps of:

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2   (g)   if it is determined in step e that the inventory requires replenishment, then

3   determining the demand type of the product to be replenished; and

4   (h)   determining a replenishment method based on at least the demand type of the

5   product to be replenished.

1   4.   A method for maintaining an optimal level of inventory comprising the following

2 steps:

3   (a)   determining an optimum level of at least one product in inventory of inventory

4   residing at a first location;

5   (b)   determining an optimum level of at least one product in inventory of inventory

6   residing at a second location;

7   (c)   sensing the inventory level of at least one product in inventory at the first location

8   and the second location to determine if the inventory level of the product is less

9   than the optimum level at either location;

10   (d)   if it is determined in step c that the inventory level of the product is less than the

11   optimum level at one of the first location and second location, then determining a

12   method to replenish the inventory; and

13   (e)   if it is determined in step c that the level of inventory is greater than or equal to

14   the optimum level, then repeating step repeating step c and subsequent steps.

1   5.   The method of Claim 4 comprising the further steps of:

2   (g)   if it is determined in step e that inventory requires replenishment, then

3   determining a demand type of the product to be replenished;

4   (h)   determining a stockout cost based on at least the demand type of the product to be

5   replenished;

6   (i)   determining a lead-time of replenishing the product via an inventory

7   replenishment source.

1   6.   The method of 5 wherein the inventory replenishment source comprises an

2 external inventory source.

1   7.   The method of 5 wherein the inventory replenishment source comprises an

2   internal inventory source.

1   8.   The method of Claim 7 wherein replenishing inventory via an internal inventory

2   source comprises the following steps:

3   (1)   determining the inventory level of the product at the each of the first and second

4   locations;

5   (2)   determining a profitability level based on at least a cost of transferring inventory

6   from the one of the first and second locations having an inventory level greater

7   than or equal to the optimum level, to the other one of the first and second

8   locations where the inventory level of the product is less than the optimum level;

9   (3)   if it is determined in step 2 that the profitability level is met, then transferring

10   inventory of the product from the one of the first and second locations having an

11   inventory level greater than or equal to the optimum level, to the other one of the

12   first and second locations where the inventory level of the product is less than the

13   optimum level, to replenish the inventory; and

14   (4)   if it is determined in step 2 that the profitability level is not met, then replenishing

15   the inventory from an external source.

1   9.   The method of Claim 8 determining a profitability level comprising the following

2   steps:

3   (a)   determining the demand type of the product to be replenished; and

4   (b)   determining a cost of transferring inventory of the product from the one of the

5   first and second locations having an inventory level greater than or equal to the

6   optimum level, to the other one of the first and second locations where the

7   inventory level of the product is less than the optimum level to replenish the

8   inventory.

1   10.   The method of Claim 9 further comprising the following step:

2   determining a quantity of the product to be transferred to ensure that the profitability

3   level is met.

1   11.   The method of Claim 10 further comprising the following step:

2   determining a time period for transferring inventory from the one of the first and second

3   locations having an inventory level greater than or equal to the optimum level, to the other one of

4   the first and second locations where the inventory level of the product is less than the optimum

5   level to ensure that the profitability level is met.

1   12.   The method of Claim 5 wherein if it is determined that the demand type is spares,

2   then providing a method for maintaining optimum inventory level, the method of maintaining an

3   optimum inventory level of spares comprising the following steps:

4   (a)   determining an optimum safety stock level;

5   (b)   determining a lead-time for replacing safety stock;

6   (c)   locating a failed component;

7   (d)   replacing the failed component with a spare residing in safety stock;

8   (e)   determining if the replacement spare is defective;

9   (f)   if the replacement spare is defective, then replacing the defective spare with

10   subsequent spares residing in safety stock until an operational spare is discovered;

11   (g)   sensing the safety stock level of spares to determine if the safety stock is less than

12   the optimum level of spares;

13   (h)   replenishing the safety stock with additional spares if the safety stock is less than

14   the optimum level; and

15   (i)   if the safety stock level is not less than the optimum level, then repeating step g

16   and subsequent steps.

1   13.   The method of Claim 12 wherein in step f if no operational spare in the safety

2   stock is discovered, then a stockout condition occurs.

1   14.   The method of Claim 13 further comprising a method for determining a

2   probability of a stockout condition occurring, the method comprising the following steps:

3   determining a safety stock level;

4   determining a lead-time for replenishing the safety stock;

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5   determining a rate at which spares are removed from the safety stock; and

6   determining if the safety stock level will be equal to zero before replenishment of the

7 safety stock is obtained.

1   15.   The method of Claim 14 wherein the lead-time is a time interval between ordering

2 the safety stock and obtaining the safety stock.

1   16.   The method of Claim 14 further comprising a method for determining a fixed

2 stockout cost, the method for determining a fixed stockout cost comprising the following steps:

3   determining an expected amount of stockouts for a known safety stock level; and

4   determining a total cost of the known safety stock level.

1   17.   The method of Claim 16 further comprising a method for determining the total

2 cost of the known safety stock level, the method comprising the following steps:

3   determining an ordering cost;

4   determining a holding cost;

5   determining a stockout cost; and

6   summing the ordering cost, the holding cost, and stockout cost to provide the total cost

7 for the known safety stock level.

1   18.   The method of Claim 5 wherein if it is determined that the demand type is lumpy,

2 then providing a method lumpy demand inventory replenishment comprising the following steps:

3   (a)   determining a time period;

4   (b)   determining an amount of inventory orders during the time period by means of

5   performing a compound Poisson distribution with a predetermined rate; and

6   (c)   determining a quantity of inventory in each inventory order by means of

7   performing a normal distribution.

1   19.   The method of Claim 18 further comprising a method for determining a safety

2 stock level of lumpy demand inventory, the method comprising the following steps:

3   (1)   determining inventory order undershoot;

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4   (2)   determining a standard deviation over lead-time;

5   (3)   determining a safety factor; and

6   (4)   multiplying the standard deviation by a summation of the safety factor and the

7 inventory order undershoot to determine the lumpy demand safety stock level.